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THE WORK OF THE U. S. FISH COMMISSION.

THE report of the U. S. Commissioner of Fish and Fisheries for the year ending June 30, 1898, shows an increase in the propagation and distribution of food-fishes of about 40 per cent. over the work of any previous year.

The number of adult and yearling fishes, fry and eggs distributed in public and private waters or transferred to the State authorities was about 857,000,000, of which the largest number represented important commercial species, like the shad, cod, whitefish and salmon. There were thirty-three hatching stations and sub-stations in use, the steamer *Fish Hawk* being also utilized for shad-hatching in Albemarle Sound and the Delaware River.

The extension of the salmon-hatching work on the Pacific coast was especially gratifying, as the enormous annual drain on the salmon streams of that region makes it very important that the supply should be kept up by artificial means. At the sub-station situated on Battle Creek, a tributary of the Sacramento River, the largest collection of the salmon egg (48,000,000) in the history of fish-culture was made in the fall of 1897.

Particular attention was also paid to the hatching of young lobsters, owing to the steady decline in the lobster fishery, and as a result of these efforts no less than 95,000,000 fry were turned loose.

There is little doubt but that the future success of the lobster industry depends on the possibility of artificial propagation, and the same may be said of the salmon fisheries of the Pacific coast. What may be hoped for is shown in the steady increase of shad in the eastern United States.

In 1880 the catch was only about 18,000,000 pounds, and the catch steadily decreased until 1885, when the results of artificial propagation became observable. By 1888 the catch had doubled, and in 1896, the

last year for which there are accurate data, the catch amounted to 50,866,368 pounds, with a market value of \$1,656,711, the value of the increased catch for that year alone being something like \$800,000 in excess of the total cost of all shad propagation up to that date. Extended tables show the output of the different hatcheries and the details of the distribution of the eggs and fry of the various species.

The Division of Inquiry respecting food-fishes has made various investigations regarding the oyster, including a survey of the oyster grounds of Louisiana and a re-examination of the much-vexed question as to the origin of the color of green oysters. In regard to this the report states that in the United States it has been repeatedly demonstrated by the Commission that the green color is due to vegetable matter which serves as food, and that there is no impairment of the edible qualities of the oyster. The reason for the color of the 'red oysters' noted during the season of 1896-97 is unknown, as no opportunity was given to investigate the problem, but it is suggested that it may be due to the presence of the infusorian *Peridinium*.

In view of the scarcity of mackerel, which has extended over a longer period than ever before in the history of this fishery, special study has been given to the embryology, natural spawning and artificial propagation of this species. Its practical propagation is still an unsolved problem, and it is noted that under existing conditions the number of eggs obtainable is too small to produce any appreciable effect, while suggestions are given for enlisting the aid of the fishermen. The principal work of the Division of Statistics has consisted of canvasses of the more important fisheries of certain of the New England and Middle Atlantic States and of the Great Lakes, the information thus collected being made immediately available by the publication of

single-sheet bulletins. It is proposed to continue the issue of these from time to time whenever there is information of special interest. Attention is called to the fishery resources of the Yukon River, which so far have been utilized only by the Indians for their immediate needs, but which it is believed may afford a food supply to the miners and traders who have been attracted to that region, and ultimately to the country at large. Full statistics are given of the sections covered by the report, and it may be noted that at Gloucester and Boston there has been a falling-off in the aggregate receipts of fish since 1896, while the South Atlantic States as a whole show an increase in the product, the amount of capital invested and the number of persons employed in the fisheries.

What strikes one very forcibly in glancing over this report is the many discouragements the fish culturist is called upon to face and the large number of serious losses due to unavoidable, often seemingly trivial and sometimes inexplicable, accidents. A few degrees of temperature, more or less, a heavy shower, the lingering of ice or an unfavorable wind may cause heavy damage and almost bring to naught the labor of weeks. Another thought is to what extent should the general government undertake the propagation and distribution of the more strictly game fishes, such, for example, as black bass and trout? The investigation of the best methods for the accomplishment of such work should undeniably lie with the United States, but these once discovered, its continuance should rest with States and individuals. What may be done by individual effort is shown by the fact that a large number of the many ponds of Plymouth county, Mass., have been stocked with black bass by the simple process of carrying a few fish in pails from one pond to another. It may be said that the establishment of many of the trout hatcheries has

been due to the efforts of members of Congress and not to any desire of the Commissioner of Fisheries. The propagation of such widely-spread and all-important species as cod, shad, the Pacific salmon and the lobster is quite another matter and should properly be carried on by the United States.

The statistical as well as the strictly scientific work of the Fish Commission is again of national importance, and the special omission of fishery statistics from the coming census bears testimony to the value of the work done by this division.

It is gratifying to learn that the appropriation for scientific work has this year been materially increased, for, from past experience, we know that what to-day appears to be a purely scientific problem to-morrow becomes an all-important practical matter. In this connection Dr. Smith urges the appointment of an expert in fish pathology, calling attention to the large mortality which often prevails among fish, both under natural and artificial conditions, and for which there is at present no known cause or remedy. The annual losses at the hatcheries of the Commission, while not excessive, are still great enough to demonstrate the need of skilled investigation, and the present expenditure of a few thousand dollars may yield subsequent returns of millions.

Last, but not least, it may be again noted that under the present Commissioner it has been arranged to keep the laboratory at Wood's Hole under the scientific direction of Professor Bumpus open throughout the year.

ENGINEERING AND THE PROFESSIONS
IN EDUCATION.

THE receipt of the annual volume of *Proceedings of the 'Society for the Promotion of Engineering Education'** is a reminder of

* *Proceedings of the Sixth Annual Meeting of the Society for the Promotion of Engineering Education*, Vol. VI. Published by the Society. 1898. 8vo. Pp. xxvii + 324.